

An Inaugural Essay
on the
Circulation of the Blood
for the degree of
Doctor of Medicine
in the
University of Pennsylvania
by Joshua Rhoads
of Pennsylvania
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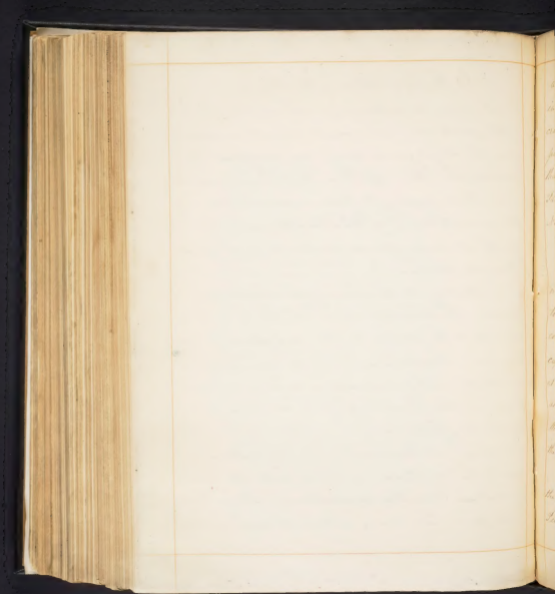
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On the Circulation of the Blood.

Previous to entering, on the consideration of the particular powers, concerned in circulating the blood; and before we undertake to investigate their relative influence & importances, it will be proper, to take a general view of the circulation, & of the simultaneous operation of the various powers combined, as we find them in man.

Anterior to the time of the illustrious Richat, the circulation was divided by most authors into the great, & small, or Systemic, & Pulmonary: this division, (though apparently of small moment,) exercised a deleterious influence, on the Physiology of the circulation: for by it, the Heart is placed in relief, by being the beginning, & termination of both systems; whilst the capillaries are thrown into the background — From this circumstance, Physiologists were for a long time, induced to overlook their

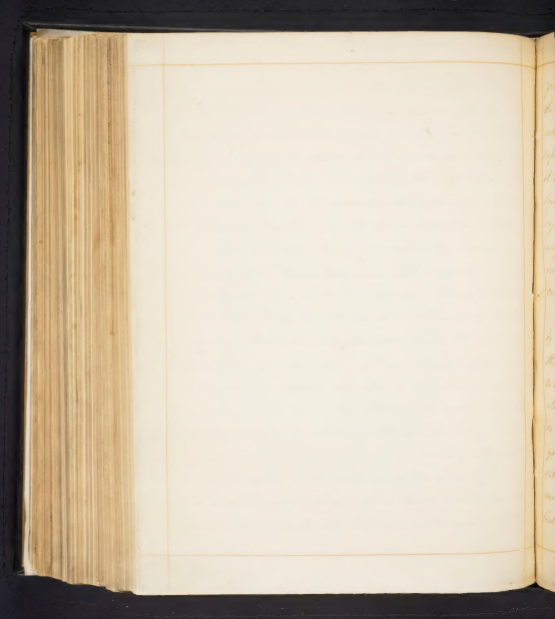


action, & considered the Heart, as the primal source in the circulation. But Richat, with that discrimination & judgment which he always displayed, and which enabled him to give Physiology, that station & stability, which its importance to Pathology, and its interest to the inquirer into Nature & Nature's works, entitle it; divided it into 1st. "Vascular system with Red Blood"

& 2nd. "Vascular system with Black Blood".

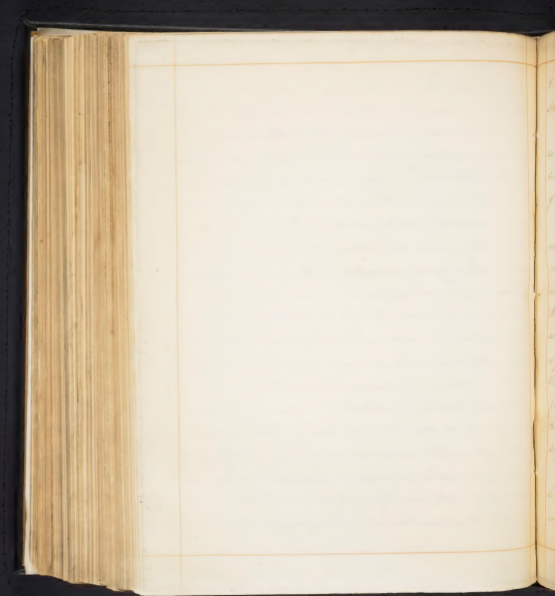
1st That which conveys the Blood from the Pulmonary to the general capillary system & 2ndly. That which conveys the Blood from the General to the Pulmonary capillary system. I now here will see the Capillaries at each extremity of the two systems; & can perceive at a glance, the relation and circulation bears, to that, of some of the inferior animals: for example the Caterpillar.

The circulation of Red Blood commences in the capillaries of the Lungs, then flows through the Pulmonary Veins into the left Atrium of the Heart;



from the left Auricle into the left Ventricle; from
the left Ventricle it is driven into the Aorta, through
whose branches it is distributed to the general
Capillary system, where it is converted into Black;
it then enters the Veins, which transmit it to the
right Auricle; from the right Auricle it enters the
right Ventricle, which forces it through the Pulmo-
nary Artery, into the Pulmonary Capillary system,
where it is again converted into Red, & pursues the
course before stated.

Since the circulation of the Blood was discovered
by the immortal Harvey, Physiologists have directed
their attention to the powers by which it is moved, &
to their relative influence & importance: But
although they have attained a degree of certainty
in regard to the action of some of these powers,
yet (from the numerous variations to which the
vital principle is subject, from our imperfect
means of experimenting, & above all from our
inability to form theories & opinions, or ascertain

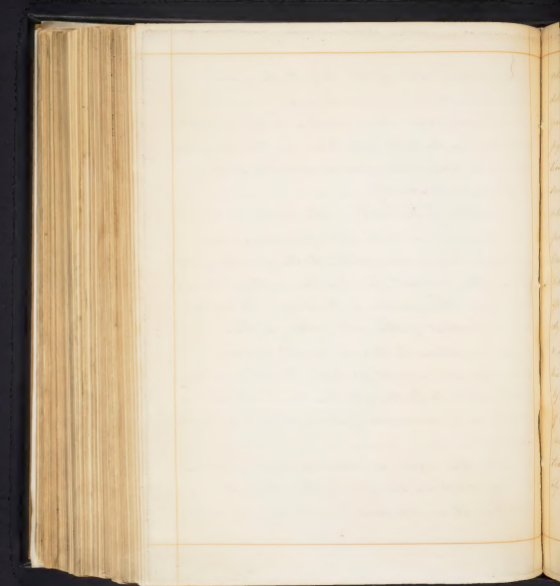


& insufficient data,) the subject may still be said to be obscure & uncertain.

Having said thus much, as to the circulation as a whole, we will now take up the consideration of the principal powers concerned, & treat of them individually.

• Firstly Of the Heart. The Heart is a hollow muscle, endued with vital properties, which continues longer susceptible to the operation of stimuli, after animal life has been extinguished, than any other portion of the body. Its motion is independent of the will, although there are a few exceptions to this in record; but even in these cases, it is most probable that the individuals first ceased to breathe, & then the Heart motion ceased as a consequence; such at least is Boerhaave's supposition.

That this organ is endued with contractility is very evident, but it is contentious to doubt, whether it is possessed of what may be called



































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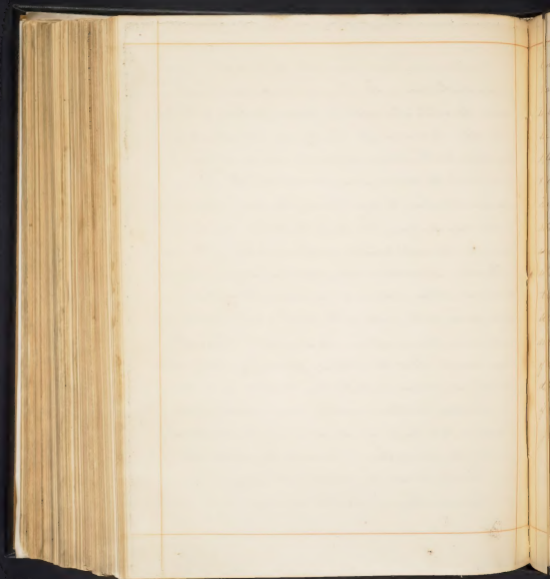




as it is so much more frequently exposed to the purifying influence of the Air, and passes so much more speedily through the various portions of the body. Secondly - To communicate the various ingredients of the Blood, as the Lymph, Chyle, &c; which it may be worth while to observe, are poured into the Veins & consequently have to pass through the Heart, where it is, if we may so say, stirred by the Valves, Chorda Tendon. &c, before it is distributed for the nutrition of the body.

Thirdly - To communicate a general impulse to all the organs, & thus sustain a constant excitement, I consider as one of the uses of the Heart & not the least most unworthy of notice - In support of this, I may observe that the Arteries generally have deep situations, which most Authors consider as a provision of nature for their security from wounds, but I believe both the giving an impulse to surrounding parts & the prevention of wounds were intended by it.

What tends to support the supposition of the impulse being of essential service in the Animals



Economy is, that the Heart is attached in such a manner to the Aorta, that when it has contracted, it recoils & communicates such an impulse to the Aorta, so, that it can very evidently be seen externally, now by the Laws of Mechanics - action & reaction are always equal - consequently the Heart receives as great an impulse & blow as the Aorta - We also see (when a portion of the Cranium is removed) the Brain pulsating from the impulse which is communicated to it, by the alternate contractions, dilatations, & locomotions of the Arteries seated at the base of the Cranium - Must not this action, perform some essential service in the economy of the Brain? Would an organ of its importance & delicate structure be subjected to such an impulse if it did not assist in the performance of its functions?

To the Editor